

What is Claimed is:

1. A trip unit comprising:
a housing;
a plunger mounted with respect to said housing, said plunger having a first position, a second position, a third position, a first portion and a second portion, the first portion of said plunger being outside of said housing in said second position, the second portion of said plunger being inside of said housing in said third position;

means for latching said plunger in said first position and for releasing said plunger from said first position to said second position;

means for biasing said plunger to said second position;

a rotary trip lever pivotally mounted with respect to said housing, said rotary trip lever including an elastic arm, the second portion of said plunger engaging said elastic arm in said third position; and

a trip actuator including a member having a first position, a second position and a third position, which resets said trip actuator, the first position of the member of said trip actuator corresponding to the first position of said plunger, the second position of the member of said trip actuator engaging and rotating said rotary trip lever in a first rotational direction, in order to engage said means for latching and release said plunger from said first position, said rotary trip lever rotating in an opposite second rotational direction in response to the third position of said plunger and engaging the member of said trip actuator, in order to move said member to the third position thereof, the elastic arm of said rotary trip lever flexing after said member reaches about the third position thereof, in order to accommodate any overtravel of said plunger.

2. The trip unit of Claim 1 wherein said plunger includes a latch surface; wherein said means for latching said plunger is a trip bar including a first tab and a second tab, which engages said latch surface; and wherein said rotary trip lever includes a surface, which engages the first tab of said trip bar, in order to rotate said trip bar and disengage the second tab from the latch surface of said plunger, in order to release said plunger from the first position thereof.

3. The trip unit of Claim 1 wherein said trip actuator is a solenoid including a magnet; wherein the member of said solenoid is an armature; and wherein said magnet attracts said armature in the third position thereof in order to reset said trip actuator.

4. The trip unit of Claim 1 wherein said plunger is a rotary plunger, which is pivotally mounted with respect to said housing; wherein said rotary plunger includes a latch surface within said housing; and wherein said means for latching is a trip bar including a tab, which engages the latch surface of said rotary plunger, in order to latch said rotary plunger in the first position thereof.

5. The trip unit of Claim 1 wherein the elastic arm of said rotary trip lever is made of a molded material, which flexes in response to said overtravel of said plunger beyond the third position thereof.

6. The trip unit of Claim 1 wherein said rotary trip lever is pivotally mounted on a first axis; and wherein said means for latching said plunger is a trip bar, which is pivotally mounted on a second axis, said second axis being normal to said first axis.

7. The trip unit of Claim 1 wherein said housing includes a surface; and wherein said plunger is flush with the surface of said housing in the first position of said plunger.

8. The trip unit of Claim 1 wherein said means for latching said plunger is a trip bar pivotally mounted within said housing, said trip bar including a tab; and wherein said trip actuator further includes a linear plunger engaging said rotary trip lever, in order to rotate said rotary trip lever to engage the tab of said trip bar.

9. The trip unit of Claim 8 wherein the tab of said trip bar is a first tab; wherein said trip bar further includes a second tab and a spring biasing said second tab with respect to said housing, in order to bias said trip bar to pivot in a third rotational direction; and wherein said rotary trip lever engages the first tab of said trip bar, in order to pivot said trip bar in an opposite fourth rotational direction.

10. The trip unit of Claim 1 wherein said plunger is a rotary plunger including a first pivot engaging said housing; and wherein said means for biasing said plunger to said second position includes a second pivot engaging said

rotary plunger at a position offset from said first pivot, a member engaging said housing at a position offset from said first pivot, and at least one spring disposed between said second pivot and the member of said means for biasing said plunger.

11. The trip unit of Claim 10 wherein each of said second pivot and the member of said means for biasing said plunger includes a first end and a second end; and wherein said at least one spring is a first spring engaging the first ends of said second pivot and the member of said means for biasing said plunger, and a second spring engaging the second ends of said second pivot and the member of said means for biasing said plunger.

12. The trip unit of Claim 11 wherein the first portion of said plunger being outside of said housing in the second position of said plunger is generally pie-slice shaped and includes a first sub-portion having a first radius and a second sub-portion having a smaller second radius, said first sub-portion being adapted to engage a latch of a circuit breaker frame.

13. The trip unit of Claim 1 wherein the first portion of said plunger being outside of said housing in the second position of said plunger includes a surface adapted to engage a latch of a circuit breaker frame.

14. A trip unit comprising:

- a housing;
- a plunger mounted with respect to said housing, said plunger having a first position, a second position, a third position, a first portion and a second portion, the first portion of said plunger being outside of said housing in said second position, the second portion of said plunger being inside of said housing in said third position;
- a trip bar pivotally mounted with respect to said housing, said trip bar latching said plunger in said first position and releasing said plunger from said first position to said second position;
- a spring mechanism biasing said plunger to said second position;
- a rotary trip lever pivotally mounted with respect to said housing, said rotary trip lever including an elastic arm, the second portion of said plunger engaging said elastic arm in said third position; and

a trip actuator including a member having a first position, a second position and a third position, which resets said trip actuator, the first position of the member of said trip actuator corresponding to the first position of said plunger, the second position of the member of said trip actuator engaging and rotating said rotary trip lever in a first rotational direction, in order to engage said trip bar and release said plunger from said first position, said rotary trip lever rotating in a second rotational direction in response to the third position of said plunger and engaging the member of said trip actuator, in order to move said member to the third position thereof, the elastic arm of said rotary trip lever flexing after said member reaches the third position thereof, in order to accommodate any overtravel of said plunger beyond the third position thereof.

15. The trip unit of Claim 14 wherein the member of said trip actuator is a linear plunger, which engages and pivots said rotary trip lever, in order to engage and pivot said trip bar.

16. The trip unit of Claim 14 wherein said plunger mounted with respect to said housing is a rotary plunger pivotally mounted with respect to said housing; and wherein said trip bar includes a tab and a spring engaging said housing and the tab of said trip bar, in order to bias said trip bar to latch said rotary plunger in the first position thereof.

17. The trip unit of Claim 14 wherein said plunger is a rotary plunger including a first pivot engaging said housing; and wherein said spring mechanism includes a member engaging said housing at a position offset from said first pivot, a second pivot engaging said rotary plunger at a position offset from said first pivot, a first spring and a second spring, the member of said spring mechanism and said second pivot including a first end and a second end, said first spring engaging the first ends of said second pivot and the member of said spring mechanism, and said second spring engaging the second ends of said second pivot and the member of said spring mechanism.

18. A circuit breaker comprising:
a circuit breaker frame comprising:
a housing,
a line terminal,

a load end terminal,
separable contacts electrically connected between said line terminal and said load end terminal,
an operating mechanism moving said separable contacts between a closed position and an open position, and
a latch mechanism latching said operating mechanism to provide the closed position of said separable contacts and releasing said operating mechanism to provide the open position of said separable contacts; and
a trip unit comprising:
a housing,
a line end terminal electrically connected to the load end terminal of said circuit breaker frame,
a plunger mounted with respect to said housing, said plunger having a first position, a second position, a third position, a first portion and a second portion, the first portion of said plunger being outside of said housing in said second position, the second portion of said plunger being inside of said housing in said third position;
a trip bar pivotally mounted with respect to said housing, said trip bar latching said plunger in said first position and releasing said plunger from said first position to said second position;
a spring mechanism biasing said plunger to said second position;
a rotary trip lever pivotally mounted with respect to said housing, said rotary trip lever including an elastic arm, the second portion of said plunger engaging said elastic arm in said third position; and
a trip actuator including a member having a first position, a second position and a third position, which resets said trip actuator, the first position of the member of said trip actuator corresponding to the first position of said plunger, the second position of the member of said trip actuator engaging and rotating said rotary trip lever in a first rotational direction, in order to engage said trip bar and release said plunger from said first position, said rotary trip lever rotating in a second rotational direction in response to the third position of said plunger and

engaging the member of said trip actuator, in order to move said member to the third position thereof, the elastic arm of said rotary trip lever flexing after said member reaches the third position thereof, in order to accommodate any overtravel of said plunger beyond the third position thereof.

19. The circuit breaker of Claim 18 wherein said plunger further has a reset position, which resets said trip bar.

20. The circuit breaker of Claim 19 wherein said plunger is a rotary plunger; and wherein the second portion of said rotary plunger is pivoted inside of the housing of said trip unit in said reset position.

21. The circuit breaker of Claim 18 wherein the housing of said trip unit includes a surface adjacent to said circuit breaker frame; wherein said trip unit is adapted for disengagement from said circuit breaker frame; and wherein said plunger includes a surface, which is about flush with the surface of the housing of said trip unit in the first position of said plunger.

22. The circuit breaker of Claim 18 wherein said plunger is a rotary plunger; wherein the housing of said circuit breaker frame includes a surface; wherein said rotary plunger includes a surface, which is pivoted outside of the housing of said trip unit in said second position; and wherein when said trip unit is disengaged from said circuit breaker frame, the surface of said circuit breaker frame cams the surface of said rotary plunger to pivot said rotary plunger to be about flush with the surface of the housing of said trip unit.

23. The circuit breaker of Claim 18 wherein said plunger is a rotary plunger; wherein the housing of said trip unit includes an opening for said rotary plunger; wherein the opening of the housing of said trip unit includes debris after a trip of said circuit breaker frame; and wherein when the first portion of said rotary plunger is pivoted outside of the housing of said trip unit, said rotary plunger sweeps said debris out of the opening of the housing of said trip unit.

24. The circuit breaker of Claim 18 wherein said plunger is a rotary plunger; wherein the first portion of said rotary plunger being pivoted outside of the housing of said trip unit in the second position of said rotary plunger is generally pie-slice shaped and includes a first sub-portion having a first radius and a second sub-

portion having a smaller second radius, said first sub-portion being adapted to engage said latch mechanism of said circuit breaker frame.